studies are needed before recommendations regarding prophylaxis can be made. Prophylaxis of contacts more than 6 years of age is probably not justified.

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Splenic Trauma in Children

RUPTURE OF THE SPLEEN is the most common intra-abdominal injury occurring in children following blunt trauma. Emergency laparotomy and splenectomy are customarily carried out. However, an increasing awareness of the syndrome of overwhelming postsplenectomy infection (OPSI) has caused many pediatricians and surgeons to reevaluate this form of treatment.

While the incidence of sepsis following splenectomy secondary to trauma is low, the associated mortality is 58 times greater than that reported for similar infections in the general population. Classically, these infections occur abruptly with a florid bacteremia and a high incidence of disseminated intravascular coagulation. Death, frequently occurring within hours of onset, is seen in 80 percent of cases. *Diplococcus pneumoniae* is the causative organism in most instances, followed by *Haemophilus influenzae* and *Neisseria meningitidis*. Children less than 5 years of age are usually affected and, in most cases, OPSI is seen within two years following splenectomy. Several patients, however, have been adolescents at the time of splenectomy and infections have occurred as late as 15 years following splenectomy.

Due to the high mortality associated with OPSI, penicillin prophylaxis for up to two years following splenectomy has been advocated, but efficacy of this regimen has not been proved. Pneumococcal vaccine is now available for clinical use; however, this vaccine is only effective against 80 percent of pneumococcal infections and is not recommended for children less than 2 years old. There are reported instances of pneumococcal sepsis in postsplenectomized persons who have received pneumococcal vaccine that includes the type of organism responsible for the infection.

Alternative methods of management have recently been proposed for children with traumatic rupture of the spleen because of the possible risk of OPSI. New surgical techniques have been developed that make it possible for the injured spleen to be repaired and preserved. Several clinical reports have been published showing the feasibility and safety of this form of treatment. Another approach is nonoperative observation after confirming the diagnosis of an isolated splenic rupture by either splenic scan or arteriogram. In such instances, the children are admitted to an intensive care facility where their conditions can be carefully monitored. Surgical operation is not done if a patient's hematocrit stabilizes within 48 hours and the need for transfusion does not exceed a third of the patient's blood volume. Twenty patients have been treated in this manner at the Children's Hospital Medical Center in Boston. Splenectomy was not required in any patient and there were no late sequelae.

An interesting article by Pearson and co-workers suggests that splenosis following traumatic splenectomy is more common than previously thought and may protect against OPSI. In 13 of 22 children there was splenic activity one to eight years following traumatic splenectomy. Splenic scans done on five children showed significant extrahepatic uptake of radionuclide. The protective effect of splenosis is open to question, however, because autopsies in several fatal cases of OPSI following traumatic splenectomy have shown significant splenosis or accessory spleens. This finding supports the experimental evidence that the quantity of splenic tissue and the vascular supply to this tissue are important factors in the prevention of pneumococcal sepsis. Several studies also indicate certain specific splenic functions act independently of others. Consequently, the ability of splenic tissue to remove degenerate red cells does not necessarily correlate with its ability to prevent pneumococcal sepsis.

Based on the above discussion, the following recommendations can be made. A child in whom a splenectomy has been done should be given a pneumococcal vaccine. Penicillin prophylaxis should probably be instituted as well and continued for at least two years following splenectomy. While the efficacy of penicillin prophylaxis has not been well documented, many physicians recommend lifelong treatment with penicillin in children after splenectomy. When an emergency laparotomy is carried out in a child and an isolated splenic injury found, splenic repair should

be attempted if technically feasible. Observation without immediate laparotomy can be considered in certain cases of blunt abdominal trauma in children after confirming an isolated splenic injury by splenic scan or arteriogram. Adequate pediatric intensive care facilities must be available so that the child can be constantly monitored.

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Acetaminophen Toxicity

TOXICITY FROM OVERDOSES of acetaminophen has become a well-recognized entity during the past few years. Fortunately, basic scientific studies have provided sufficient data to design a rational and effective treatment. The National Multiclinic Open Study for evaluation of N-acetylcysteine has provided more data than expected in the more than 1,500 cases collected during the past two years. Some observations are now possible about the incidence, diagnosis and treatment of acetaminophen overdose.

Ingestion of acetaminophen in children even when there are toxic blood levels produces rare hepatotoxic effects. While a few cases in young children have resulted in very high serum glutamic oxaloacetic transaminase (SGOT) levels, the outcome has been almost universally satisfactory. In one case with a SGOT level as high as 20,000 IU per liter, the patient left the hospital with no toxic sequelae on day 7. Acetaminophen then produces a very rapid rise in SGOT with rapid resolution of the toxic process.

In 18 percent to 25 percent of persons older than 12 years, toxic blood levels will be found and some alteration of hepatic enzymes detected. Correlation between history and toxicity is totally lacking and the only way to determine whether a patient has potential for hepatotoxicity is to determine blood levels four or more hours after ingestion. Mortality has been less than 0.4 percent and in fatal cases the patients had generally sought medical attention more than 24 hours after ingestion. Morbidity is most common in those patients seen by a physician between 16 and 24 hours after ingestion and is rare in those patients presenting up to 16 hours after ingestion. Treatment has been provided for all patients up to 24 hours after ingestion.

Even in those patients with SGOT levels above 1,000 IU per liter, no residual toxicity has ever been found. Liver biopsies at three months and a year after hepatotoxicity show no abnormalities.

There has been a major misconception about chronic toxicity. Salicylates, for example, have cumulative kinetics and therefore chronic salicylism may result following therapeutic use of the drug. Acetaminophen, on the other hand, does not have cumulative kinetics and cannot continue to rise in concentration unless the dose is continuously raised. This chronic toxicity is reduced in persons taking an excessive amount of acetaminophen over a period sufficient to deplete hepatic gluthethione as in an overdose.

The National Multiclinic Open Study was not a controlled study in the usual sense because of a number of ethical considerations. In using historical controls, even with the related statistical problems, clear-cut advantages in reduction of peak SGOT levels were obtained. The drug is still on an Investigation New Drug license and permission to use the drug, as well as the method, can be obtained by calling 800-525-6115.

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Human Breast Milk—Storage and Safety Considerations: Protective Effects

DEBATE REGARDING the benefits of human milk in infants of low-birth weight continues. The ease of digestibility, the presence of host resistance factors and the decreased incidence of sensitization with foreign protein are the reasons that human milk is being used with increased frequency in intensive care nurseries. Currently, few data are available on the effects of collection, processing and storage of various components of the milk. Human milk contains large quantities of macrophages and lymphocytes; however, these cells cling to the sides of glass containers, thus reducing the quantity available for the infant. Slow freezing, lyophilization, pasteurization (63° C for 30 minutes) and sterilization (100°C for 20